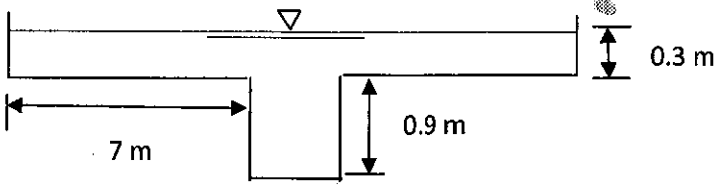
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-3 EXAMINATION- 2024
B.Tech VI Semester (CE)

COURSE CODE (CREDITS): 18B1WCE639 (3) MAX. MARKS: 35
COURSE NAME: OPEN CHANNEL FLOW AND HYDRAULIC MACHINES
COURSE INSTRUCTOR: NIRAJ SINGH PARIHAR MAX. TIME: 2 HR.

Note: *(a)All questions are compulsory. (b)Marks are indicated against each question in square brackets.(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems*

1. A compound channel of 17 m top width, 3 m bottom width and bed slope of 0.0002 is shown in the figure below. Taking Manning's N as 0.02, calculate the discharge through the channel using method of partial area and total section. **[5]** (CO1)



2. Derive the universal equation (valid for all channel section types) for critical flow. Find the critical depth of flow for a open channel triangular section carrying a discharge of 1 cumec and having vertex angle of 120°.**[5]** (CO2)

3. Derive the dynamic equations of gradually varied flow stating all the assumptions. **[5]** (CO3)

4. Derive the condition for critical flow depth in a rectangular channel for rapidly varied open channel flow. Also derive the relation between the conjugate depths for rectangular channels. **[5]** (CO3)

5. The normal depth of water in a rectangular channel 1.5 m wide is 1 m. The bed slope of the channel is 0.0006 with a Manning's N=0.012.
   a) Determine the critical depth of flow.**[2]**
   b) At a certain section of the same channel, the depth is 0.92 m, while at a second section, the depth is 0.86 m. Find the distance between the two sections and location of the second section with respect to the first section (U/S or D/S). **[5]** (CO3,4)

6. A rectangular flume 2 m wide carries a discharge @ 2 cumecs. The bed slope of the flume is 0.0004. At a certain section, the depth of flow is 1 m which reduces to 0.9 m depth at a section D/S of it. Comment on the flow and the channel type and draw the water surface profile.**[4]**(CO3)

7. A rectangular channel carrying supercritical flow is provided with a hydraulic jump type of energy dissipater. If it is expected to dissipate 5 m of head of water in the formation of the hydraulic jump and the inlet Froude no. is 8.5, determine the sequent depths and the power lost during the jump. **[4]** (CO3,4)

JUIT TEST-3 EXAMINATION DEC 2024